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# AVIATION

*The Oldest American Aeronautical Magazine*

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## BREEZE CONNECTORS



Stainless steel connectors with specially designed contact pins insure reliable, trouble-free connections. Mounted for easy and convenient access to the back of equipment.

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A glance at the list at the bottom of the page will show the varied products contributed to the industry by BREEZE. From ignition accessories to fuel and oil tanks BREEZE offers the most complete line of aircraft parts and accessories of any one in the business. Improve the safety and operating economy of your airplane or airline, equip with BREEZE products. CONTRIBUTORS to the UNITED STATES GOVERNMENT.



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June 1950

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# Vanguards of AERIAL DEFENSE



THE Seversky P-51 Pursuit and the T-28A Conquest Fighter have readily gained universal recognition as the most effective units of aerial defense in the world. Together with their unequalled speed, their effective range of 4000 miles and their formidable armament, this single-seater Pursuit and two-seater Conquest Fighter present an impenetrable defense against air attack.



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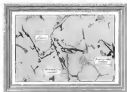
AIRCRAFT CORPORATION

1800 ISLAND

NEW YORK

Builders of the World's Fastest Airplanes





*Diagram of a typical domestic flight, showing a pattern of connections to 100 cities.*

## Useful Alloys of Aluminum Do Not Just Happen

Then, when alloy has become an industrial commonplace, the very fact of alloys is one of the significant changes in modern industry.

For industry, cast products only to its essential improvement. The metals, including aluminum, are among nature's important materials. And alloys are simply metals built to industry's own specifications.



An alloy begins with a metal having certain characteristics, additional qualities are developed by diluting

are combination with other metals. The result is usually a new metal, with certain properties greatly improved and with new kinds of usefulness.

Natural characteristics of aluminum are lightness, resistance to corrosion, and excellent heat conductivity. When various metals share common advantages, coupled with a new set of physical properties, such as greater strength or hardness, research is called upon to develop a new alloy.

The specifications demanded become a definite problem for attack in the laboratory by metallurgists and other scientists who are grounded in the theory and the behavior of alloy development.

After they have developed the best alloying in-

gredients and the processes necessary to develop optimum characteristics, the alloy is put through thousands of tests to determine whether the desired qualities have been achieved, and particularly whether the results are uniformly dependable.

The experts in manufacturing have their sayings, too. Can the alloy be cast or worked as intended? How does it machine? What of welding? How about surface finish?

It takes time to make an alloy—many men in other endeavors (and expensive) equipment. And it takes time.

Research has already developed many different alloys of aluminum, each with its own special combination of useful characteristics. How many more will be needed by aviation, only time can tell. Some are as startling for a this morning, and what we are learning in such study will be helpful in meeting the new static specifications which are now most seriously will be laying down tomorrow.

This is one of the ways we are accepting our responsibility to aviation and to the general public. ALCOA COMPANY OF AMERICA, 2012 Giff Building, Pittsburgh, Pennsylvania.



# ALCOA · ALUMINUM

AVIATION  
June 1937  
1



ARE EQUIPPED WITH

## NORMA-HOFFMANN

PRECISION BEARINGS

During 1937, 30 of these two-engine flying boats, built for the U. S. Navy, completed four non-stop mass formation flights totaling 161,600 non-stop airplane miles. More than 200 of these PBY-1 units have been ordered by the Navy, from Consolidated Aircraft Corporation, San Diego, Calif., builders.

The privately owned "Globe", identical with the PBY-1 except for omission of armament, is the only flying boat to span the Continent in a single hop—three of such flights having been made, one (San Diego to New York) in 17 hrs. 2 min.

NORMA-HOFFMANN PRECISION BEARINGS are largely used throughout these ships—in the plane itself, in the engines and controls, and in the Pioneer, Kollsman and Sperry instruments. Their accuracy and dependability contribute to the fine performance of these flying boats.



"Where the bearings were not cut full—was lost at sea, and in the air—NORMA-HOFFMANN Precision Bearings are the choice of engineers and designers of planes, engines (including superchargers), engine accessories, control systems, instruments, radio equipment, compasses and landing field equipment. It is a 'Must' for the Gearing Air line equipment work with you."

NORMA-HOFFMANN BEARINGS CORPN., STAMFORD, CONN., U.S.A.

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1923-1938

# CONSOLIDATED

A PIONEER IN THE DEVELOPMENT OF LONG-RANGE, OVER-WATER AIRCRAFT

First, Consolidated's  
**COMMODORE**—Four  
teen ships of this type  
were built. Twelve are still  
in active service.



Then came the **RANGER**  
—Fifty-five of this model  
were constructed



Consolidated's **PBY TYPE**  
—Two hundred and twelve  
of these patrol bombers  
delivered or now building



—and now **XPB2Y-1** —  
Newest and mightiest  
arm of the Navy's coast  
defense

15 SHORT YEARS . . . yet those vital years in which American aviation cast off its swaddling clothes in a super-conquest of space and time. CONSOLIDATED looks backward on achievements almost incredible . . . yet forward confidently toward a future development beyond the bounds of present-day imagination!



**CONSOLIDATED**  
AIRCRAFT CORPORATION  
San Diego • • • EST. 1925













## Wheels Down!

The beginning and the end of every flight involve Landing Gear Security. Hence, manufacturers of airplane wheels, brakes and shock struts stress every precautionary measure known to modern engineering practice.

The wide experience and the vast facilities which Bendix places at your disposal are not duplicated. From thorough going mechanical control to the most exhaustive testing and proving of structural soundness, Bendix conducts the design, the manufacture, the testing and the field servicing of landing gear equipment just exactly as you would, if the responsibility were yours.

Wheels down! Let Bendix study your landing gear problems and advise you. Keep your eyes and ears and unswinkled for the handouts of other tough problems which beset the aircraft designer!

**BENDIX PRODUCTS CORPORATION**  
AIRPLANE WHEELS AND BRAKE DIVISION

(Subsidiary of Bendix Aviation Corporation) South Bend, Indiana

# BENDIX

AIRPLANE WHEELS • BRAKES • PILOT SEATS • PNEUMATIC SHOCK STRUTS



BY  
**ROBERT  
OSBORN**

✱ WE ARE BY THE PAPER that the politicians of Big Springs, Texas, really found a big rat tail and used it as an aerial tow of the country as a publicity stunt advertising National Air Mail Week.

Individually this gesture was hardly appropriate for the real aviation. The traditional fireworks and games in spite of a lack of connection and are from publicity, and can't go to spring back up when they have wrapped on repeatedly. How, ever, a real and not of such value



will certainly take the price out of its action and this is over into the modern group.

✱ OUR HEARTS CONGRATULATING to America's Number One Economic Marshal Mr. Harry Ford, for his transportation and construction of the Wright Brothers' biplane ship, as which was built the first successful engine.

Whether or not we agree with the

economic policies of the New Deal, it must be admitted that Mr. Ford has improved on the Republic of old or that he is not only a "big man" but, by the position one of his accumulated wealth, provides to work some role in it.

✱ WHEN arriving to the records of the biplane of the Wright Brothers, it is not only that the Wright Brothers themselves established the new two-engine biplane tradition of repair and maintenance records. In building their airplane at Dayton, Ohio, and flying it at Kitty Hawk, N. C., they set the tradition that airplane factories and the other parts of the field and supported by hundreds of narrow bridges and other natural constructions. Of course, some records factories are built right on the edge of airports, so that planes can be rolled out of the back door ready to fly but the importance from our old tradition is actually not repeated in our last crisis.

✱ SOME RECENT AIR CLOSURE reports show nearly all passengers in flying national lines from the air—the only dropping that allows to them to participate from a biplane or airplane flying national.

The national agencies in a collective and individual but average progress means the law of colored tradition. The rules are going to end

a new man will to replace the former "Come and get it before I show it again."

✱ FINALLY, according to Mr. Ford Don't attempt to add the first airplane ever carried in an airplane to your Greenfield Village museum. We let come some time ago when the first closed in the daily press reached 1,252 stories, stories.

✱ A DISCOVERY collection reports that playwright George S. Kaufman is organizing a We Never-Fly Club, having no its motto, "Don't Fly, Don't Fly, Don't Fly."

The air lines should immediately organize a World Better-Fly Club with the motto, "True Fly and You Don't Take It With You."

✱ THE MOST SECRET AERONAUTICAL SECRETARY THOUGHTS is the statement in a British month magazine that a new type of biplane was shown while on an test flight, he spoke of an airplane having power, instead of being lost in the North Sea as was reported.

Offhand word use this word's possible. There are always in every line" in a new airplane design, we



are sure that the Japanese biplane is superior of the other country model and it might back again when it landed.

✱ THE new version of airplane factories developed at California, Institute of Technology certainly has proved to be of great assistance to air line operations. This is the system which gave concrete prediction for as much as a week ahead for some of the cases of "Vail Four" and "Vail Five" data obtained from meteorological conditions and weather observation flights.

For their best research project which would pass the present loss to every industry, especially Aviation. If successful, we suggest that Clark undertake producing assembly plant which the government will be one week ahead. This might be accomplished by something along the same line—a study of the rail from which men were of the President's "men" legislation, and the first air from from the sailing off by Congressmen.





#### HEIL HELIUM!

WHAT causes Secretary Edes to locate his complete about-face in the matter of selling helium to Germany is completely beyond our comprehension. It was less than a year ago that the good Secretary agreed his recommendation to President Roosevelt is which he stated that it was not only perfectly safe, but also the duty of the United States as a good neighbor to make wholesale supplies available to Germany to promote scientific development of airships, and to promote safety of lighter-than-air operation across the North Atlantic. The Secretary's letter was made public when the President sent a memorandum to Congress on the subject on May 28, 1937.

Mr. Edes seems to be playing a lone hand in spiking the German request at this time for, according to reports that are available, all the Army and Navy experts agree that Dr. Eckener's request should be allowed. Perhaps it was the small amount requested that scared him, for by careful arithmetic he could calculate that the cubic footage ordered would more than fill the LZ-130 twice over. What he probably did not know is the fact that even with the most efficient type of airship operation, approximately 500 per cent replacement of helium gas per year is normal. Then, too, it is a matter of good operating ability to maintain a supply of helium at a constant sufficient to replace the entire content of one gas cell at any time. That reserve alone amounts to approximately one million cubic feet. It seems a pity that one man should thus be able to stand in the way of a development of real importance to aeronautical science all over the world. Germany has assembled a vast mass of experience in building and operation of lighter-than-aircraft, and we believe it would be a serious mistake to hamper airship progress at this stage by too seriously restricting helium export. Dr. Eckener is in accord with the statement that large airships will never again be permitted to fly commercially on hydrogas. If it is only a matter of disagreement on amounts required, we hope that Secretary Edes will adopt a more reasonable attitude than he has lately evinced for it seems that it should be easily possible to control helium export so that the chance of the gas could never become a serious threat.



to our own security. There is too much to be yet learned about airships in commercial service to allow warblers from to spruce the whole project.

## SPRING SCHEDULES

YEAR AFTER year there are certain mares or less fond years on the aviation calendar that we look forward to with particular interest and anticipation. This year one of them is conspicuously missing—the industry's trek to the great NACA laboratories at Langley Field where basic research that keeps America first in the air goes circularly forward. Recognizing the necessity for conducting the conference under present conditions, we regret, most-of-the-less, that it must be postponed. Her past gatherings have been a constant source of interest and inspiration to the whole industry.

We trust, however, that setting will interfere with the annual assemblage of Stivers at El Paso. El Paso in the spring season is one of our favorite places. After a warm day with the sunbeams on Harris Hill the relaxation afforded in the lower air-conditioned reaches of the Mark Twain, or on the terrace at El Paso is something to give lyrical about. The general atmosphere always reminds us of an Air Show or the Air Races—it's so different. Missing are the noise and excitement—where the hectic milling about accompanied by the sounds of racing firearms and splintering cockney. Perhaps it's because the spectators haven't yet gotten up to the point of exhilaration long ago attained by their power-flying brethren. We hope they never do.

Fans is fan, of course, in anybody's league, but there is more to the El Paso show than a pleasant passing all days and nights. There is something in long last at the Harris Hill site the beginning of a movement that can be of tremendous importance to aviation in America. For in starting across a rare combination of pure sport with a dividend-paying investment. There is so much pleasure to be had in riding the thermals as in handling a spirited old boat on a lake day. At the same time there are no mere selfish desires after adrenaline and adrenal efficiency that the leaders of the ship and general sporting eagles. And the fans who spread their blue studying the behavior of the passing "barns" for the benefit of an improving sailing record—value aside—concentrate contribution to a growing fund of meteorological knowledge that guarantees safe operating conditions for coast-to-coast transports.

Time was, not too long since, when sailors in America were content to build overseas for informa-

tion and for equipment for their favorite sport. Now, thanks to the efforts of the Boeing Society and all the citizens of El Paso and other communities to provide suitable sites and adequate infrastructure for development, there is a growing number of U. S.-designed airplanes and efficient secondary types. Every year more and more put in an appearance, and put up better performances. El Paso is correct that this year's crop will be unusually interesting. We hope so, for we see all set to show off for El Paso—at the drop of a sea heliot.

## LOOSE OR TIGHT?

RECENTLY MAX ACHER, the Minneapolis aircraft operators are badly in need of a proactive organization, but the argument stops right there. Almost everyone has a different idea about how they should be organized. When you look at it all done you find on one hand the advocates of a strong, expressive, central group to fight federal legislation in Washington, and on the other hand, a loosely associated collection of local groups with little or no controlling organization. Somewhere in between is the happy medium.

An operator's problems begin right on his own airport and it seems logical that his organization should begin there too. First job is to eliminate the destructive elements of price cutting among competitors on the same field. Then he must go out and extend to the coast, slandering himself who sets himself up with a fully equipped office in the east pasture, stage a harvest during the busy season, and extend to Florida when it gets too cold for business up north. Next job is to go to work on his state legislature for protective and promotional ends. Finally there are the Bureau of Air Commerce and Congress to deal with.

Experience has shown that the local organization can do the first three of these jobs efficiently and economically. And given a good selection of active local groups, there should be no trouble in representing a national body of coastal proprietors to act in Washington spokesman for the operators. A similar setup, the American Trucking Association, Inc., has done much to solve the problems of the truck operators and there is a striking resemblance between the two types of business. It would be well for the aircraft operators, who are facing local organizations in many parts of the country, to take a tip from the truckers and build up their association on a similar plan. And these operators which are not organized, should take immediate steps to get themselves up to that their votes will be heard along with the others.



# TRANS-CANADA Rubs the Lamp

By Daniel Sayre

Journalist Editor, Aviation

Did you ever dream you were building a brand new air line? You know no month about it, right at the start, as it has taken us twenty years to learn. You have plenty of money to spend. You have no worries over government contracts, or competing air lines. You don't even have to hurry. Here's how the men at the controls of Canada's new transcontinental driver are better in just such a situation.

THEY'RE BUILDING AN AIR TRANSPORT SYSTEM in the making across the Canadian border these days. Most of it is as hard to believe as a phone call on April Fool's Day when you've just won the Sweepstakes. At least it is just about that profitable if you have been brought up on the land-and-error, run-to-through tradition of our own air lines.

To wrap it all in a few words—The Canadians, after all these years, are finally building themselves a transcontinental air line. Since last Sept. 4, the company which will operate the coast-to-coast route has been operating a complex service between Seattle and Vancouver. Since early March it has been making an experimental air and service between Vancouver and Winnipeg. By early summer there should be enough planes on hand and enough income under the belt to permit full service on that section. Experimental flying is to be pushed steadily westward. Eventually operations will be carried clear through to Moscow, and probably Halifax and St. John.

But it isn't that the Canadians are doing this thing that's really important, but how they went about it, and why they went about it in that way.

And how we are to meet up, what they will or will not accomplish. And that requires a brief background.

It's a lot easier to explain why Canada should be building a transcontinental air line, than to explain why it hasn't built one long since. Geography is to blame in these elements that have made the United States such an ideal laboratory for air transport development—real distances, borders from inland political barriers, a wide distribution east and west of the centers of finance, industry, government, agriculture and mining, a railroad system connecting their centers, a tendency to have built up flows of traffic ready for the tapping by a wider means of transport. Some will argue that Canada has but 12,000,000 people in an area larger than the United States and is thus less favorable to air line exploitation. But the large majority of these 22,000,000 live within a long east-west band along the American border, a band no wider at any point than 280



AVIATION  
MAY 1932  
21







TransCanada will be the Dominator that real modern drive, but it will have the advantage of group loans (equipment) and includes the air world has learned in twenty years. Personnel is already going bankrupt and tops at an elaborate technical program.

And by our book with a strip is no less than ideal for an office.

Certainly Canada's lack has not been the case of aviation. J. A. D. MacFarland made the Dominion's first flight in 1909 months before anyone had flown a plane in England. Major Bishop and his fellow Canadian wartime pilots were the equals or better of any comparable group in the British forces. In the early post-war years Canadian flyers pushed forward the arts of forest patrol, aerial surveying and the use of airplanes in rugged wilderness until they were undisputed world leaders in those fields. Later the development of government-sponsored flying clubs along the British pattern kept Canada's pilot-to-citizen ratio almost as high as we are.

By the end of the Twenties when one was firm his small contractors were still eating their eye teeth. The whole map of Canada—including several sections of the transcontinental runs—began Monrovia look with all small routes. Few were so well looked financially as our own. All of these had to struggle against worse weather conditions than were general.

the first—and in that stage of the wet low temperatures and snow were still *definitely* formidable. But the effort was very creditable indeed.

So far—for for a slight British account it would have been difficult to find any marked divergence between American and Canadian views. But in 1936 the Canadian forecasts came up with a different picture. The party called the Liberals and named in one called the Conservatives. It seems that in general Canadian political labels don't mean much—the Conservatives proved certainly less liberal in air transport than their opposition rival. To any one the word budget was too slow to get enough to keep a line straight while the Conservatives and the Liberals were the coast-to-coast service brought nothing.

All that is, was a chain of some 30 projects that had been started along the route in 2002 by the Ministry of National Defense. Even under the Conservatives these continued as one of the Dominican's prime relief projects. Other things came to the rescue, too, the world-wide mining boom poured new \$16 into the cluster and semi-scholarship students from the "gold"

### The Trans-Canada Act

By 1993 the elements in its wooden wing were more ready to be the east and vice versa—back came the Lifecrafts and with them a new deal for MY FURNITURE.

Move (3) Control of civil aviation was taken from the Ministry of National Defense and given to a Ministry of Transport (further created from the old Department of Railways and Canals). With control, simultaneously, came direct choice of work on the airport theme. Move (2) C. D. Howe was made Minister of Transport. Under him Commander C. P. Edwards was made Chief of Air Services. J. A. Wisnau, who had done previous service as Controller of Civil Aviation under the old setup, continued under Edwards on a staff with the title of

Move [X] The Dominion Parliament passed the so-called "Trans-Canada Air Lines Act". And it received Royal Assent on April 30, 1937. Now this is a very remarkable Act indeed and

to be announced.

(b) The formation of a corporation, to be known as the Trans-Canada Air Lines, with an authorized capital of \$1,000,000. (a) The shares should be offered in par to the Canadian National Railway Company, which may sell up to 49.5 per cent of them, but only in British subjects. (c) That low of reserve deposits be elected by the shareholders. (d) That the Government of Canada, the Canadian Council, (e) That the Minister of Transport enter into contract with Trans-Canada Air Lines for the operation of certain airlines for not less than ten years. Charges for mail, passenger and express are to be fixed by the Ministry for use in the "competitive" system of operation.

(f) That the Government may purchase the assets of the North American. (g) That the government may purchase and maintain corporation fields, make known

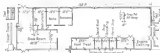
(1) That during a "preliminary period"—until Dec. 31, 1959—the Parliament will pay a subsidy equal to any operating deficit the company may suffer; (2) That thereafter such rates shall be fixed so that any deficit incurred one year will be eliminated during the following year. Or if a profit is made the said rates shall be cut.

by the amount of half of each profit. However mail rates are never to be lower than rates paid for coast to coast mail service in the United States. And "expenses" are defined for purposes of figuring profits and losses as inclusive of payments for depreciation, insurance and 5 per cent interest on the capital invested.

**Teacher Address**

The last thing you can imagine a government school-owned air line in the U.S. doing is hiring a foreigner to head up its early and critical mission. Yet the job was hardly dry on the Air before Trans Canada stepped across the border and engaged P. G. Johnson, as Vice President in charge of Operations, responsible solely to S. J. Hangerford (who as Chairman and President of Canadian National

The first floor plan shows a large central hall (100' x 100') with a central staircase. To the left is a large room (100' x 100') and to the right is a large room (100' x 100'). The plan also shows several smaller rooms and a central staircase.



OneCombiner main vertical beam will be at Waspway where the "dead" Suez barge is under way completion. Dredges are so designed that the greatest clear span at 100 ft. can be extended to 120 ft. A two-story wing is provided for operations and executive offices. The ship layout is by O'Brien & Gere.





10



# BIRTH OF A PROPELLER



Passes into through Curtiss-Wright Company's propeller manufacturing unit at Buffalo. Following through on electrical controllable pitch propeller from rough forging to finished product.



7 Second view of the C & S One finished machine with blade set up in place on table.



8 After finishing work, blade is carefully balanced against a master blade.



9 Operating nature and condition electrical equipment are checked to insure final assembly.



10 Pitch checking mechanism with motor and gear train are put together with master blade assembly.



11 Second view of final assembly department with inspection checking the overall operation.



12 Further check to final assembly with master blade being shape in the background.



13 A final check to the propeller able to be removed from the machine.



14 The final product, a Curtiss-Wright electric controllable mounted on an Army pursuit ship.



1 Rough hub is chrome-plated and set up in lathe to select specifications.



2 Propeller are rough machined, centered by magnetic method for center.



3 Final machining includes internal grinding in lathe section in very precise tolerances.



4 In final form the hub is carefully machined all over, since this contributes to the smooth finish.



5 Set at the end of largest electric drive shaft before mounting and final machining of hub ends.



6 Check of blade grinding operation in use of the Engineering & Research Corp. grinding machine.



# What's Wrong with **CAR**

"We sincerely believe that the revised Air Traffic Rules, whether left as they do, the changes requested is every constructive comment and criticism, if cooperation with safety will permeate strictly into the following statement: First, that member on the Air Traffic Rules are concerned, the director pilot every fly with exactly the same latitude as before over any part of the United States, of any altitude and at any time, provided he and his airplane are properly qualified to do so, and that the restrictions placed upon the cockpit (per our recently those based on the imperative need for safety pilots, from to certain busy airports and to terminals area, which is stressed) will be concerned.

There will be wilful deeds, further misadventures, at the portents of the Air Traffic Rules, as is the case with any new law in regulation, and these misadventures it is, of course, our duty and duty to study as best we can about them — actually, we cannot call us do have about them.

"No record of 'longer going' is indicated; discussion was given any useful progress within one of the 14 divisions in the discussion which the time to reduce the thought to will be, perhaps, all the specific in justice which he and his associates had been done. It will then forward his letter to the Bureau of Air Commerce at Washington. He will find that the Bureau actually welcomes the opportunity either to carry a mission or accept an apparent mission."

The "general rules of the road" observed during gene regulation in yeast, genes we need developed, she changed, but a rule apply everywhere, don't they stay away from switches, repressors

the wind, had the field possible elementary rules of flying, rules not those of a flying machine, but of a flying man, he would have gained the flight training some automatic, the young pilot seemed to be able to. But he was not.

After progressive amounts of genetic codes necessary for dispersion to be made in weather to permit navigating objects on a flight requires wholly or in part dimensions and

law.' It's obvious you can't drive your car at night without lights, but the law says you can't do it, just the same. There is nothing in the old traffic rules except provisions designed by actual and continued usage to be read *stricto jure*.

The "general flight rules" are those orders of the road which have been observed ever since there were any flying regulations whatsoever and, as it is said, grew with the nation as the need developed. The grouping may be different, the phrasing somewhat changed, but actually the same old rules apply such as: Safe obstacles of flight, don't throw things overboard, stay away from peak obstructions and safety, emergencies, take off and

the wind, had the same way, use of the field possible. These and similar elementary rules make up the common sense of flying. The general flight rules are those which should be mastered by a flying student concomitantly with his ground school work and primary flight training. They should have become automatic reactions by the time the young pilot has sufficiently progressed to be able to make cross country flights in good weather.

After progressing beyond the elements of general flight rules it becomes necessary to draw a definite line of distinction between those flight rules in weather conditions such as to permit navigation safely by observing objects on the ground, and those flight rules requiring navigation either wholly or in part, by the aid of instruments and radio.

The contact pilot need not concern himself with flight plans or flight plan changes, precise altitudes or flight dispatches for his movements, the direction, color designation, or control of civil airways. Again assuming that the general flight rules are observed,

he may fly between any two points in the United States without ever knowing that he is in or out of the circuit, in or out of control areas or restricted areas. It is not necessary that he have any knowledge of the many rules for the protection of instrument flying, provided he has adequate visibility to see and be seen and stays sufficiently distant away from the clouds. (A cloud might cover another airplane just about to give

To select against the three categories, general context, and intermediate flight rules it should be noted that the general flight rules apply only

rights anywhere in the United States, but that contract and instrument of sale apply to only those parts of the United States over which it is possible to fly by instruments alone, namely the ground facilities provided by the Bureau of Air Commerce, namely the fixed airports of the United States. The Federal government does not adequately come on ground or air.

Only relatively few plans have progressed to the degree of sophistication necessary to manage cross country by the use of instruments and rules alone. All together they make up probably not more than two or three per cent of the total of all plans. Devoting the necessary magazine space to analysis of the instrument rules for a handful of years would not be justified. The rules as crafted by the Bureau seem to be clear, concise and understandable.

At first they may appear somewhat startling and burdensome to the public, considering attempting to serve as investment rating. But they are nothing more than the first steps to the education and course of training required of any pilot in order to become a successful investment pilot.

They are certainly much less difficult to master than the airline pilots' program. He must know all the details of hangar-vehicle operations. He must know not only the use of instruments, but also engine, analysis of weather, the proper operation of landing flaps, retractable landing gear, gas valves, etc., how to maintain an accurate course from one point to another without seeing anything more than the instrument board, and all this while operating on a precise schedule arriving due consideration to passenger comfort.

The air traffic rules have been a good for one and only one purpose and that is safety both for the occupants of aircraft and for the people on the ground beneath the aircraft. If this fact is remembered while reading the rules, there should be general agreement that, worthy and legitimate as some planners may seem, the Bureau has never lost sight of this objective and every procedure or policy followed is based solely on a foundation of demonstrated need, practice.

**S**OMEONE LITTLE AND UNBELLISHED will need to affect a number of people before he can accomplish his goal, the color keeper has concluded. But when these private and sometimes off-Bureau or off-Commerce men travel, he shows the country, or write on his headquarters at Washington, they find that the answers are nothing to keep anybody on the ground. Looking in on the Bureau department heads and listening into their conversations, a lot as find they are asked some 200 questions by private buyers—and those who want to be. But a quick talking down of the questions shows they are really a half dozen queries made in different ways. And answering the answers does likewise make a short and easy story.

ually very simple. There are two mistakes why they can seem complicated. One, the Department of Commerce had to write them so that pilots, controllers, lawyers, and inspectors could all understand them. It's difficult to please so many kinds of people with the same style of writing. Second, the rules are actually low, and low has to be written clearly and de-

On the other hand some of "Chapter 300" may seem too simple at least to children. Professional artists find it a rules regarding them to do things that they have always done in a matter of course. But they must remember that these are demands of youngsters who do not yet have the basic foundation and practice on which to go and must not look down on them.

be sufficient visibility to see other aircraft and to be seen by the pilot of other aircraft in the immediate vicinity in time to avoid collision. In the flight rules, constant flying is predicated on this theory. Careful reading of the rules will clearly indicate that the only requirement for a pilot to make a contact flight (of course in accordance to general flight rules) is that

---

Indomitable flying rules necessarily are much more rigid and exacting, inasmuch as the vital means for the provision of collision between two aircraft in flight, on instruments, is by instructions and information relayed to and from the pilots of those aircraft through the medium of radio.

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[illegible]

## EVALUATION



**A**IRPORTS ARE BEING BUILT AT AN ever increasing rate, and it is not surprising that the Department of Commerce should be at a loss to know whether the facilities of many large airports be- come congested from the regular scheduled flights at the major airlines. The answer is in the increased landing speeds of the large commercial airplanes, which will require runways of increased length compared to those provided by most of the existing airports. Increasing demands are being made on the pilot's skill when taking off and landing his ship, and it is impossible to suppose that this situation cannot be altered to become less dangerous. Growth in wing loadings up to 30 lb per sq ft, at wing area with pressure of higher values, accompanied by greatly im- proved elements of design and construction are the principal reasons for the phase of the operational prob- lem and wing flap slots or other auxiliary devices have by no means provided a satisfactory answer to the difficulty.

The following discussion briefly touches upon an important part of the landing problem, namely, the glide into the airport preparatory to the landing. The several graphs are based upon the flight performance of a low wing monoplane possessing a wing area of 145 sq ft. Since the aim of the article is of a purely general nature, no attempt is made to introduce specific experimental data.

Experience proves that it is diffi- cult to duplicate, even in an approxi- mate manner, the landing characteris- tics of an airplane. Variation in ap- proach and speed are probably the principal reasons for this fact. The

# GLIDING into the AIRPORT

Many airports cannot expand fast enough to accommodate the increased demands of some of the bigger trans- ports now on the way. With the prob- lem of runway length becoming more acute, a minute examination of the technical aspects of the pre-landing glide is in order.

By Prof. A. H. EINISDELL

Cambridge Institute of Technology

this reason an airplane must be based on assumed conditions and characteris- tics which may be considered as approximating to the average of those observed in flight tests. With this limitation in mind, Fig. 1 represents the landing path of an airplane from the time it passes over the airport

boundary until the plane comes to rest. In the customary manner the landing is divided into three parts. The distance  $S_1$  defines the air run, and is measured from the point where the airplane passes over the field bound- ary, as a glide at approximately con- stant speed until fairly close to the run-

way surface when the airplane is level- ed off, and if there is sufficient resid- ual kinetic energy from the glide, the airplane may float for some dis- tance  $S_2$  with decreasing speed until contact is made with the solid surface and a ground run of  $S_3$  feet is made to the point of rest. There is no well- defined demarcation for the transition distance  $S'$  between the free glide and the final portion of the landing. This section of the approach path may sometimes be entirely short, and at other times begin before the airport boundary is reached. Still air landing is assumed.

Wing slapping or other automatic conditions employed in land airplanes, are not considered. The obstruction height "H" marks the maximum height at which the airplane enters over the airport boundary.

## The Angle of Free Glide

With engine not on, the descent ac- cording to an airplane in gliding flight may be approximately represented by the curves of Fig. 2, where L and D are lift and drag respectively. W is the gross flying weight,  $\theta$  is the angle of glide and  $\delta$  is the angle of attack. The arrangement of the curves indi- cates that for steady flight, the glide angle "D" depends on the relation between L and D as expressed by the formula:

$$\tan \theta = W/L = C_D/C_L \quad (1)$$

From a practical standpoint, it is desirable to make the air run as short as possible without incurring un- desirable effects on the remainder of the landing performance such as ex- cessive gliding and making speeds. Thus, the glide angle  $\theta$  should be as large as possible, and this is seen to depend upon the relation between the overall drag and lift coefficients for a given

airplane. In contrast to the above, when approaching an airport it may be desirable, because an engine trouble, to make a flat glide at a small value of  $\theta$ . Under such circumstances the minimum value of the lift-drag ratio determines the distance of the free- glide path. In modern airplanes the minimum value of  $C_D/C_L$  varies from about 8 to 14, and therefore the mini- mum free glide angle will range from 4 to 5 deg. for the aerodynamically cleaner airplanes, to 7 and 8 deg. for those of lower aerodynamic effec- tiveness. It is evident that the pilot has direct control over the glide angle, since he can vary both  $C_L$  and  $C_D$  by manipulation of elevators and flaps.

In the present case, we are not con- cerned with the approach glide, but only with that part of the glide which commences within the immediate environ- ment of the airport at an angle of attack somewhat lower than the stall angle. The curves of Fig. 3 show, in a general way, how the free glide angle of a low wing monoplane with rounded leading gear may vary with the wing flap control and in some extreme down position. Variations in flap design and other factors, will cause wide differences in the relative position of such curves, but their general shape and location will be about as shown. A study of the two curves brings out several interesting facts. First, these diagrams are similar to the effect of the flap being to shift the curve to the right and upward. Secondly, there is a single angle of attack and hence  $C_L$  for which D has its lowest value. For a properly de- signed flap gear there should be an appreciable difference between these two values of  $\delta$ , but in the present instance the wing flaps were not as effective as they might have been, and (This is page 47.)

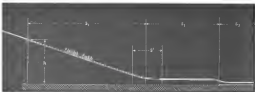


Fig. 1—Airplane glide path from field boundary to point of rest.

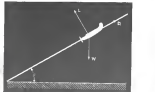
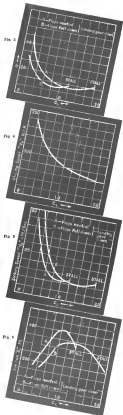


Fig. 3—Effect of wing flaps on glide angle



# Testing the DC-4

Since testing a ship as large as the DC-4 presented unusual problems. The accompanying shots show how they were solved by the Douglas engineering staff in the Santa Monica factory.



The hydraulic control panel in the hangar (below) was used to offset the relative pressures of the system of hydraulic jacks used in carrying loads in the water wing and nacelles. The steel structure of the slides supported the entire system used in applying oil loads in the water wings. In addition to the weights been shown load was simultaneously applied to the tail surface and bubble the nacelles. The airplane is shown set up for the high angle of attack test, with tail lowered.

An indication of the problem encountered in the production of the new large planes is pointed in the pictures to slide and left of the ship shown. Communication between the wings and the tail surfaces during the test was obtained by telephone, the distance 0.08 in being no need for the control valve.



Above: The DC-4 is prepared for testing of water motion. The slides which appear on the lower forward wing surface were used to adjust the hydraulic system for applying oil loads. They were undisturbed in place and not removable. The airplane had not yet received their final covering when the photo was taken, not were the rollers in place.



Above: The lifting oil loads were applied to the water wing through a hydraulic system attached to the upper surface (as seen in picture) and being carried through rubber pressure (see picture) supported by the steel framework shown. The lift loads on the lower wing were produced by hydraulic jacks acting on the bottom surface.







## G-100 WRIGHT Cyclones

With Two Speed Supercharger and Chandler-Graess Carburetor Released for Export

Earlier announced for the G-300 Cyclone, the Wright two-speed supercharger and the Chandler-Graess carburetor, with which the engine may be equipped, has been announced by Moses B. Gordon, vice president and general manager of the Wright Aeronautical Corporation. The G-100 Series Cyclone has been in operation for a year as a standard domestic airplane. First foreign deliveries are in a Douglas DC-3 for R.C.M.

Basically similar to its predecessor, the G Cyclone Series, the new G-100 includes many refinements resulting from research and operating experience of the Army, Navy and commercial operators here and abroad. Displacement, 1300 cu. in. (G-100 is at 1300 hp, 1000-cu. in. and same displacement, 1000 cu. in. and the installation of the

two engines in one. Designed by Wright in cooperation with Army Air Corps engineers at Wright Field, the design provides engine with two distinct sets of performance characteristics. The first increases the weight of the engine by only 35 pounds.

The two engine effect is produced by changing the blower ratio in speed of the supercharger. During speed of motor hours, load reduction in its blower rate, the two-speed supercharger is fixed in the low blower ratio position which enables the pilot to obtain full take-off power. Up to a specified altitude the amount of supercharging made available by the low blower ratio provides maximum performance. When a certain height is reached, the engine may be switched over high blower to produce its best power at high altitude. The shift from low to high blower is made by the single winged arm of the control lever to the right of the engine.

The G-100 Cyclone (the previous Cyclone Series is a nine cylinder, eight rated sea-level engine of 1025 cu. in. displacement) is a two-cylinder in two models both with a 16-1 propeller speed reduction gearing, which differ from each other only in their supercharger drive gear ratios. The low, the G-100 (G-100) is rated at 1000 hp. for take off with 800 hp. available for normal operation from sea level to 5000 ft. The revised, the G-100 (G-100) has 1000 hp. for take off, with 800 hp. for normal operation from sea level to 10,000 ft. These power ratings and performance are obtained with fuel of 80 octane number.

Except for its steel construction, and apparent speed-reduced air and fuel inlets on the supercharger and cylinder head baffles a small in operation of an assembled Cyclone G-100 model not reveal such details.



Low fuel consumption is realized by the use of the Chandler-Graess carburetor.

ing unusual difference from its preceding G model. In other, it is nearly as with larger in diameter. It is to permit the use of a new type of liquid aluminum alloy, yet low ribbed on the outside at the head for strength and cooling, and lined on the inner side walls, which has a longer skirt and two three compression and three oil control rings. The ribbed barrel was lengthened slightly to allow for the longer piston.

Greater volumetric efficiency of the engine has been provided by improvements in combustion chamber design and that of the intake and exhaust ports. This provides a total cooling surface on the engine equal to a five foot 10 in. long by 10 in. wide. This area has been "folded up" as an engine 50 in. in diameter by 40 in. long, leaving a total cooling surface of 100 sq. ft. in its depth. The 100 sq. ft. in its depth may be met as a production operation.

Connecting rod refinements have kept with the development of higher horsepower. In the G-100 Cyclone a master rod with an 20° section rather than the earlier 12° section shape together with improved bushing pins allow a better explanation of stresses between the link rods.



Along the crankshaft with dynamic bearing. Drive flange are fitted on the outside for drive and cooling.

and the main crankshaft bearing. All rods are heat treated with maximum accuracy and polished to a mirror surface.

As in previous Cyclone models the main bearing section is divided into six segments. The G-100 Cyclone, however, in addition to its steel supercharger casings has a larger diameter alloy main section in place of the cooling ring on all but the last bearing.

To enable this new shaft to reduce the main section and to incorporate the valve tappet guides also provides for a constant speed propeller governor drive. The drive is so designed that it may be readily removed without the necessity of removing the main section from the engine. The drive all passages in the bearing supply also have internal slots.

(Time is May 1935)



## SWALLOW Coupe

A SMART LOOKING two place coupe has just been offered by the Swallow Aircraft Corporation, at Wichita. The Model C is powered by the Hercules 120 hp engine. A three place coupe, the Model C-100 (100 hp, Hercules) will be available for delivery.

The Model C is of conventional construction with wood and fabric wings and welded aluminum fuselage and tail. Landing gear and all controls are fabric covered. Landing gear is of the tail wheel type with shock absorbing mechanism directly applied but easily accessible for servicing. Total is 7 ft 6 in. in 6.5 ft with which fuselage is used.

Large windows and a sliding "V" type triangular windshield of safety glass provide excellent visibility after the inverted engine in the nose. A good sized baggage compartment at the rear and accessible in flight and glow map compartment are located in the right side of the instrument panel. An electric starter is standard equipment.

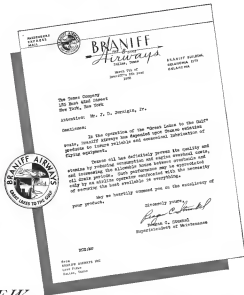
Specifications as furnished by the manufacturer are as follows:

Length overall	26 ft 4 in.
Wing overall	7 ft 2 in.
Span	26 ft 4 in.
Weight empty	1300 lb.
Gross weight	1900 lb.
Wing area (including ailerons)	140 sq. ft.
Top speed	125 mph.
Cruise speed	115 mph.
Landing speed	40 mph.
Climbing speed	240 ft.
Service ceiling	12,000 ft.





"INCREASING ALLOWABLE



NEW



TEXACO

AVIATION  
June 1934  
28

HOURS BETWEEN  
*overhauls and  
oil drains*"

*Rogers C. Stunkel*



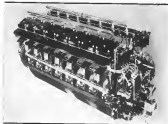
Rogers C. Stunkel, Branch Manager  
Dept. of Maintenance, whose letter ap-  
pears on the opposite page.  
(Right) Stanley Shorn, overhaul man,  
J. C. Wood, service crew, and E. H.  
Buckley, chief mechanic, working over  
the engine of a Braniff airplane.



*Airplane* OIL

AVIATION  
June 1934  
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The powerful 1200 hp. Mercedes-Benz DB 601 aircraft diesel which will be used in the new Zeppelin LZ 129.

## German AIRCRAFT ENGINES

Continuing a discussion started in AVIATION for May, in this section recent developments in diesel engines for airplanes and for heavier-than-air machines are covered.

### PART II

By Paul H. Wilkinson

Editor of "Diesel Aircraft Engines"

THE Daimler-Benz group of engines, perhaps in the most interesting of all, has been as it occupies an entirely new kind of power plant. In it are the Daimler-Benz, at least two cycle and four cycle designs, as represented by the products of Junkers and Daimler-Benz respectively. Although the many years these two concerns have produced gasoline engines they have not neglected their Diesel development and as a consequence, they are now the undisputed leaders in this field. For the lightweight light weight type of diesel on demand for airplane use the two-cycle design with its high efficiency and low fuel consumption has been found to be the most suitable. For warships, the four-cycle diesel at slower speed is preferred.

The airplane diesel now in mass production at the Junkers diesel factory at Jüterbo in the Luftwaffe is a two cycle "Jumo" 205 or 204 cubic dis-

placement. The model most commonly in Junkers Ju 86 passenger aircraft and on transport flying boats and seaplanes is the "Jumo" 204-C with a rating of 660 hp at 1700 r.p.m. and a maximum cruising output of 518 hp. It weighs 1,140 lb., at 150 lb. per hp and has a fuel consumption, under actual operating conditions, of 0.46 lb. per hp-hr.

A later model, the "Jumo" 208-C, is rated at 700 hp at 1800 r.p.m. and has a maximum cranking power output of 546 hp which makes its weight 161 lb. per hp. A third model of the same series, the "Jumo" 205-E, develops 690 hp at its best and has a maximum output of 555 hp at 1800

r.p.m., which brings its weight down to 142 lb. per hp. It is claimed for the last mentioned engine, that it has a consumption of 0.35 lb. per hp-hr.

For commercial use, the "Jumo" diesel is equipped with a gas-driven mechanical supercharger, similar to that used for gasoline engines which sometimes is rated power to an altitude of 6,500 ft. For military purposes, however, the engine is equipped with an exhaust-driven, incompressor supercharger and it is then known as the "Jumo" 207, being cooled with a rating of 750 hp at 20,000 ft. At low altitudes for ground boost the centrifugal blower is driven through gearing, at high altitudes, the exhaust-driven fan being to cut in.

Turning to the striking field, the Mercedes-Benz DB 602 diesel, (which formerly was called the L604) is a 14-cylinder line six arranged horizontally the Zeppelin-type design. As it is not supercharged, it is of considerable displacement—5,464 cu. in. to be clear—in order that a rated power output of 1200 hp at 1800 r.p.m. may be obtained at sea level. Complete test running gear, it weighs 4,520 lb., or 3.86 lb. per hp, and has a fuel consumption of 0.375 lb. per hp-hr.

In conclusion, we see that there are three general ability, three high performance and two long-range aircraft engines in production in Germany today. These are the products of two concerns of vast resources and means. Increasing ability. In the past, the trend of design has been toward the radical air-cooled gasoline engine for general utility purposes, the exclusive liquid-cooled gasoline engine for high performance work, and the oil-cooled Diesel for long-range flights and bombing missions. As it grows, power plant development, there has been at least one new entry into each while their Diesel development has been really superior. What the future has in store, no one can say.



A Junkers "Jumo" 205D diesel as the main engine. Equipped with a mechanical supercharger, it develops 660 hp at 1700 r.p.m.



NEW  
MARTIN 166 BOMBER

NEW  
STRIKING POWER

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# Consolidated Looks Ahead

Engineers have completed a preliminary study of a really big airplane—also, a modification of the PB-7.

LOOKING TO THE NEAR FUTURE Consolidated Aircraft Corporation has completed a study of a three-engine passenger plane. Using materials and techniques now available, and power plants that would be available in the near future, a plane could be completed, the study indicates, a single seat 15 mph faster in which outboard boost thrusts over the outer side of the wing, and the main thrust reverses up against the body of the plane. Power is harnessed by six two-thousand-horsepower engines within the wing driving three-blade propellers of 36 ft. diameter through extension shafts. All passenger accommodations are in one deck which extends approximately 50 ft. long and 40 ft. in the tail and 14 ft. in the wing, with windows in the leading edge and sky lights in the upper surface of the wing. Wing thickness at the root is a maximum of over eleven feet, with a root chord of 46 ft. and a tip chord of 34 ft. Span of the ship is 222 ft., length 244 ft., height 28 ft., wing area 10,000 sq. ft., gross weight 100,000 lb., wing loading 47 lb. per sq. ft., power loading 21.3 lb. per sq. ft., total power 12,000 h.p., cruising speed 300 m.p.h. and range of 3000 mi., with a crew of thirty, three hundred passengers, baggage, mail and baggage.

Latest version of the Consolidated PB-7 being offered to the world market is an amphibian with retractable wheels landing gear. As a military patrol bomber it would retain practically all features of the PB-7, but as used by the U. S. Navy, plus the ability to operate on land fields. As a commercial transport it would provide accommodations for approximately forty passengers in four separate compartments. Passengers are seated in three rows in this model for export.



Above: As Consolidated's engineers envision a billion flying feet for the future. Main control float is designed to retract against fuselage bottom. Below: The bomber PB-7 modified to become amphibious.

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June 1939  
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# Aircraft Radio

New Equipment for Communication and Navigation by Don Ford

## Transcanada Installs Radio Range Equipment

Adopts U.S. air navigation methods and orders equipment from Radio Receptor of New York.

ALONG THE AIR ROUTE running along the border to Transcanada Airways are new radio range beacons. Instruments manufactured by Radio Receptor Company of New York. The equipment consists of a transmitter, a power source for feeding the antenna system in the proper amplitude and phase, remote control panel and an antenna.

The transmitter is designed to operate either with 150 or 400 radio power output by means of two vacuum tube characteristics are specified. The mechanical arrangement of the radio-range assembly is such that the vacuum components are at the bottom, the lighter at the top. All tubes are mounted in a central compartment to assure good ventilation and a maximum of cooling of all parts. The radio consists of five tubes, the first containing the power supply and oscillator, the second the three audio tubes and the modulator, the third the first two audio amplifier sections, the fourth the last audio amplifier section, the fifth the antenna.

radio range equipment. On the fifth are the antenna tuning elements.

The transmitter and its antenna are connected to the radio frequency power line of the transmitter in the transmission line of each tower in the antenna array. Knowledge of the antenna system is a prerequisite for the radio range. The transmitter is fully equipped for most common radio-range operation.

## Lear Developments

In New Quarters at Rossmore Field, Rossmore Company, Transmitters

On June 1st, 1937, at Rossmore Field, the radio station got its special

of new aircraft radio equipment. It is one of the most modern radio range equipment in the world. Located in Building 25, the station of the new plant is located in a room which is air-conditioned and contains a permanently displayed radio range equipment. Let us daily drive the perfection of the radio range will be dependent on the quality of the work we do better. Which is not a bad motto for men who build radio equipment for aircraft.

Among the new equipment now in production is the UT-8 air-frequency transmitter, a 30-to-50 watt, self-excited, self-tuning, completely modified. The transmitter is used as a transmitter, by a motor driven radio receiver, to any of the preselected frequencies. Four beam type tubes are used: a 6L6 crystal-controlled master oscillator, two 6L6-G push pull modulators, and an 800 power amplifier. The transmitter power supply is connected directly with the antenna line, and is supplied in two ways. The antenna modulation between 25 to 30 watts, depending on the battery voltage and the antenna loading. A transmitter with a maximum higher voltage and power rating delivers from 25 to 40 watts the maximum power being obtained without any other changes, and including only one-half pound extra weight.

The range control is mounted directly on the control panel, as shown in the illustration. The range control contains a small motor which drives a rotary switch mechanism. The switch points are connected in turn to the various sections and to each of the separate signal circuits including both a and p. circuits which are used. All the new developments are present in the factory, the only adjustment required of the operator being antenna loading. Maximum power output is indicated by the change in plate current of the 800 power amplifier, as a meter mounted on the control panel is operated. The pilot selects the desired frequency and then, if a landing approach is used, the station is or (See page 41)

# VULTEE

World-wide demand for Vultee Long Range Attack Bombers built this ultra-modern aircraft factory, recently doubled in size! Here, outstanding engineering talent and precision production methods go hand in hand to produce a military airplane of outstanding offensive and defensive characteristics. Because it meets the demands of modern military tactics most efficiently, world powers have found in the Vultee VII-GB the answer \* to their air armament problems.



Low radio range equipment, with radio frequency circuits in separate compartments





## with the Fleet

Here's the latest of a long line of brilliant Voughts... the SB2U-2. Fifty-eight of these scout bombers will join the Navy this year...bringing new lustre to a famous name.

## CHANCE VOUGHT AIRCRAFT

One of the four divisions of  
**UNITED AIRCRAFT CORPORATION**  
EAST HARTFORD, CONNECTICUT, U. S. A.

清华大学出版社  
 Tsinghua Press  
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out until the position of maximum out-  
put is obtained.

If a coil antenna is used, a corresponding antenna feeding circuit is available for retransmitting the feed system to the transmitter output. The condenser, as shown in the photograph, is fixed in position, but may be adjusted if necessary. Tuning is obtained by moving the entire condenser unit, which consists of heavy, spaced wires. On the left, a rule is used to guide the wheel which establishes electrical contact with the coil. As the coil is moved, this wheel progresses along the length of the coil, increasing or decreasing the inductance, depending on the direction of rotation.

The Intertec LRU radio computer model ARC-5, represents a new departure in that no constant control relays are used. The moving contacts of 12 antenna relays actually do both loop switching and vertical antenna relays are contained in the antenna relays. The antenna relays, which are the antenna selector switch, the band selector switch and the tuning dial. This unit is highly flexible and will operate with loop antennas (also the aerial-sail direction indicator and omni-static responses), with vertical antennas (also Communications relay) and with a variety of antenna systems (transmit indicator direction dialing). The tuning range includes 200 to 400 kc, 500 to 1600 kc, 1825 to 2000 kc [in which the receiver auto-tune for low communication or direct communication], and 2000 to 2100 kc for loop antennas only. Complete details of the ARC-5 radio computer and such antenna connections are printed on the control panel, where

free are clearly visible at all times.

The control of volume and intensity of the receiver is provided from a separate control panel, usually mounted near the listening post. On this panel are controls for connecting the phone, switches for selecting automatic or manual control of volume, and a meter for bringing into action a low-frequency oscillator for CW reception. Two control knobs regulate the volume in the headphones and the sensitivity of the visual indicator. Also mounted on this panel is a meter for indicating airtid fallage. This meter serves the purpose not only of a tuning meter, but also gives relative signal strength of different stations or of one station as the plane approaches it.

The individual sections consist, in intermediate frequency amplifiers and radio amplifiers are contained in the main receiver housing, which may be mounted wherever convenient. The loop is mounted in a stream-lined housing, and can be supplied in either fixed or retractable mounting. The leads from loop to tuning unit may be as long as 25 feet. The weight, completely assembled, is 40 pounds.

### Bureau Publication

AMONG THE RECENT MEMBERS of the Safety and Planning Division of the Bureau of Air Commerce are two

which he is to do with ultra-high frequency experiments for traffic control and for radar range beams. The first of several work [prepared by W. E. Jackson and J. C. Hummelt] has been in progress for the past year on the Indianapolis airport. A 300-watt beam emitter, operating at 126 megacycles and capable of modulation either by voice or by i.c.w., has been used with a vertical half-wave antenna located about 50 feet above the airport. Two planes, a Weco and a Bureau plane SS-62, were equipped with crystal-controlled receivers.

Flight tests indicate the reception was reliable at all times over distances up to and including the "line-of-sight" horizon for the plane and transceiver. Reception slightly beyond this "optical" distance was possible at flying levels less than 1000 feet, whereas at higher altitudes reception was feasible considerably beyond the optical limit.

Also at the Indianapolis airport an appeal by J. C. Elmsland, Jr. of a 190-watt 65 megacycle four-course radio range transmitter modulated at 1020 cycles, and keyed in the conventional 8-8-8 manner. The antenna system consists of four vertical radials, each about one-half wavelength long. The results have been highly successful. On course signals are steady, no multiple courses have been detected, the one-off-curve is definite and uncomplicated. "Good" reception is free from static effects, and the cost of the installation is but a fraction of the



Mean based on frequency binomial: a revised Latin derivation



Antennae turning angle

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out of a low-frequency range, perhaps one-third as great.

In the March 19th issue of the *Air Commerce Bulletin*, Reader Nichols has commented on article "Radio Comes to Navigation." The article "has been prepared for the benefit of the non-technical pilot-communicator, rather than for the radio engineer."

## "Panoramic Reception"

### Makes Possible New Type of Radio Compass

Innovative research by the brilliant Dr. Walter Whitner, consulting chief engineer of New York, reveals a new means of radio reception by which a compass-type indicator may be used for radio compass references on several stations simultaneously. Having the possibilities are the establishment of signal centers having six possible received paths over the horizon, so that the pilot may follow a "plotted" course with the radio compass.

The basis of the system is a receiver which is rapidly tuned from one end of a given band of radio frequencies to the other, by means of a motor-driven tuning condenser rotating thirty times per second. The output of the receiver is applied to the vertical-deflecting plates of a cathode ray tube while the horizontal-deflecting plates are fed with a sweep voltage which has the same rate of sweep as the tuning condenser is rotated. Consequently as the fluorescent screen of the cathode ray tube, there appears a horizontal straight line, representing the area of frequency and in which is apparent good signal versus "noise" representing the stations received within the band. The height of these loops indicates the signal strength of the station, while their position on the horizontal line indicates their frequency.

If such a receiver is fed from a loop antenna, and of the loop terminals are periodically reversed (as they are in the conventional visual-indicator compass) and if the stations in the vertical deflection plates are reversed at the same time, then the "trough" in the line will be shown at below the horizontal line, depending upon whether the signal is stronger from the left or right. By employing two stations whose frequencies change periodically, and by using a system transmitting in reverse whose frequency can be controlled, it is possible to guide the pilot over a complex path simply by following contours of equal frequency between the two stations.

## Legal Horizons

(Continued from page 21)

of the road being subject to judicial review or determination, and the concept of the unimodal authority being necessary to allow a locomotive to stop. Now it is necessary that a certificate shall be granted by the railroad commission that public convenience and necessity require the construction of the road."

In 1910 the Congress passed what is now known as the "Transportation Act" giving the Interstate Commerce Commission the power to issue or deny certificates of convenience and necessity to the railroads. It undertakes to develop and secure for the people of the United States an adequate railroad system. It recognized that preservation of the carrying capacity and conservation of the financial interests of the individual carriers is a matter of national concern, that the property employed must be preserved to carry a reasonable return; that the backing of railroad investments is a matter of national concern and that the burden of this issue eventually falls upon the public; that competition between carriers may result in harm to the public as well as to itself; and that what is rational in fact may appear as irrational in the public mind, leaving the law.

The main thing appears to be, public convenience and necessity have been defined as a strong or urgent public need. You can readily appreciate that the operation of a modern airline today has necessitated larger and larger investments to the extent that government intervention and protection from public competition may be sought. There is no doubt but that if a transport company felt secure of its route and could be guaranteed against loss the consequences of that route, many of the things it now begs from the Government would be done with its own capital and much the same conclusion that a property owner would improve his property to a such greater degree than one who rented his property on a short term lease.

It is interesting to note that the American railroad problem, even with the control of the Interstate Commerce Commission, overabundant and reduced only removes competition one road with another, due to a reluctance on the part of the Government to approve obvious needed improvements and building

the railroads and courage to deny construction to new applicants. In this problem, of course, has been involved the size of labor. It is interesting to note that England recently cancelled its railroad system of some 140 companies into 4 systems. In this country there are nearly as many as seven hundred independently operating roads. Judging from the growth and maintenance achieved by the railroads in the United States, it would appear that for the future welfare of air transport systems that more strongly be joined under conditions of convenience and necessity, in opposition to the only other economic alternative of government ownership.

Now, a chilling thought on citizenship law. Air has been nationalized all over the world except in the United States. Unfortunately, it is a fact that the sovereignty over and control of the air above its frontier. As matters in this last, you see the functioning of military immigration officials, and agricultural officials in our exports of entry on the Canadian and Mexican borders. Any United States citizen wishing to fly over Canada, England, France or any other foreign country must first obtain permission through our State Department from the Government of the country concerned. Otherwise the country whose permission but not have obtained would prove to be a major Department of the military in its sovereignty regarding the carrier who would be so told or ignorant as to attempt a flight without proper permission whether be awarded as land or not.

This being a fact, the United States is then the only country that has no national legal jurisdiction of the air above its territory. The situation today is that the Federal Government takes jurisdiction of the air as opposed to the States that control, but only when interstate commerce law and custom is involved.

An effort will be made to solve some of these troublesome questions on May 23rd by a bilateral committee of several legal experts composed of the leading states. This meeting will be held in Paris. Another conference will meet on Private Air Law in Brussels in September. It has been said that American citizens would be as well as would be unwillingly controlled and it has not been over-represented. To this I subscribe, but that it is not a future growth must not only be diagnosed, but property and fully recognized. Let's by the legal rights of the air. We'll need them.



Wright Whiplash engine powered Eastern Air Lines' first fleet of airplane-Pittman, Madenjian operated on the 710-mile U.S. Air Mail route from New York to Atlanta, Georgia.

Wright Cyclone engines power all of the Eastern Douglas DC-3's of the "Great Silver Fleet" operated daily between New York, Washington, Jacksonville, Miami, Chicago, Atlanta, Miami, New York, New Orleans, Houston, and other major cities of the South and Middle West. Eastern Air Lines also makes 14 round-trip daily flights between New York and Washington.

May 1, 1938, marks the 10th Anniversary of Eastern Air Lines, age 10 years for its "Great Silver Fleet" of Douglas airplanes powered by Wright Cyclone engines.

In the brief span of 10 years, Eastern Air Lines has grown from a small air mail route, extending from New York to Atlanta, Georgia, to a great airline network serving America East of the Mississippi and Southwest as far as Houston, Texas.

"The Great Silver Fleet" now serves 16 states along 3445 miles of air routes. Nearly 200,000,000 passengers

rides have been flown to date in Cyclone and Whiplash powered equipment, with an unparallel record of safety.

Congratulations, Eastern Air Lines, on your magnificent record. Wright is proud to have played a part in the growth of your great air transportation system.

WRIGHT AERONAUTICAL CORPORATION  
Pittman New Jersey  
A Division of Curtiss-Wright Corporation

# EASTERN



# Air Lines



# Buyers' Log Book

WIDE'S New in Accessories, Materials, Supplies, and Equipment

## New Inert Gas

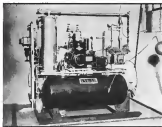
Keeps less money out in Aviation Industry

DEVELOPMENT OF INERT, A NEW TYPE of conservatively produced inert gas has been placed in the completed hands of O. J. Whitney, Inc., 9 Rockefeller Plaza, New York. The inert system was developed by the

U. S. Fire Protection Company of Halesite, N. J., and has been used extensively in other industries where fire hazard is an important consideration. Most respectable feature of Inert is its low cost of production which is approximately 25 cents per thousand cu. ft. on your premises. Composition of nitrogen 87 per cent and carbon dioxide 13 per cent, is usually controlled by a patented analyzer which operates continuously and shows rates only of the specified characteristics in the storage tanks. Inert is non-toxic and can be stored under a closed space such as a hangar without injury to the occupants. The gas may be used in order to keep inside plugs for summer release or to insure at ground line connection. Some other uses of Inert are in place of compressed air for washing down tanks.

Dispensing gasline in the deployment method.

The Inert System of Inert gas production. Welding is quicker than with Inert Protection.



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Welding gasline tanks and drums. The gas is available in bottles and in liquid for transportation. Many other uses will present themselves.—AVIATION, June, 1939.

## Thor Drills

Designed for aircraft production work

DESIGNED AND BUILT especially to meet the requirements of aircraft production, the Thor (also "Aircraft") electric drills offered by the Independent Pneumatic Tool Co., Chicago, Ill., have many features of value for such work. They are extremely light in weight, being built with bearings of new compression alloy, yet are of rugged construction. Ease of control is obtained by the generous pistol grip and balanced mounting of the drill, as well as the handy trigger control. The "Aircraft" drills are said to develop about twice the power of ordinary production drills of similar rating. Known as models U21 and U23, the "Aircraft" line incorporates the Thor triple-mounted hand formed structure and construction, compact, precision ball bearings with steel balls, ball and steel pairs, over capacity bearings, 1 in. Jacobs chuck, and numerous aluminum handles that can be locked for continuous operation of the drill.—AVIATION, June, 1939.



Independent Pneumatic Drill

## Improved Lux Control

Hand wheel gives better grip and more leverage

AN IMPROVED LUXE MODEL CONTROL for the Luxe type line extender is being offered by W. H. Kline & Company, Bloomfield, N. J. Said to be a definite improvement in the design of the control wheel in operation where of suit type construction, the new hand wheel gives a better grip and more leverage. It is provided with a pull-out pin which is kept in position at all times, ensuring positive locking and making progressive operation due to vibration impossible.—AVIATION, June, 1939.

## Auxiliary Tail Wheel

For light aircraft—Annotated by Aircraft Associates

Progress in the development of auxiliary tail wheel for application to popular types of light aircraft, Aircraft Associates, Inc., at Long Beach, Calif., has announced a new heavy duty metal auxiliary tail wheel for use in place of the heavier brackets using light aircraft, including Beechcraft, Ryan, Mooney, Cessna, etc. The



For Beechcraft, Ryan, Mooney, Cessna



For Beechcraft Models 701 and 710

new wheel set is available in two sizes, 10 in. and 12 in. and right hand diameter, pneumatic. The set wheel is easily attached to any standard type tail wheel, whether of rubber or steel ball design. Weight approximately 4 to 14 pounds. A feature of the set is flexibility in clearing through use of a rubber shock and linkage between the rubber post control arm and the wheel yoke. This feature permits the rubber and rubber control mechanism from damage which might otherwise result from sudden contact of the wheel with an obstruction on the field. The of the auxiliary tail wheel is said to make light aircraft much more easily controllable in taking under varying wind conditions, reducing use of engine and making it unnecessary for a helix to guide the plane by a wing tip during cross wind landing.—AVIATION, June, 1939.

## Improved Acetate Plantlets

New Reliance formula based on years of research

A NEW LINE of acetate making materials is announced by the Reliance Corporation, New York, N. Y. Adjusted to both compressive and acetate making, the Reliance acetate plantlets are characterized by compressive with cellulose acetate base—monomer in granular form in a wide range of colors, including crystal clear, black, and various shades of red, blue, and yellow. The plantlets are said to be transparent, weather-resistant and appear colors.—AVIATION, June 1939.



Link Model 9 Trainer and Instructor Desk

## Link Model D

New Trainer for Use with Lorenz System

THE MODEL D LINK TRAINER has been developed largely for European use with the Lorenz Landing System, selected for the radio range station. Its use is effectively one of the system of was found necessary to supply system maintenance in duplicate for the more convenient use of the station.

To accomplish this three instruments: air speed, rate of climb, and sensitive altimeter, are made to operate by means of control on the operator's desk, these instruments being synchronized with those in the pilot's cockpit. In addition there is a duplicate set of the Lorenz flight path indicator, set in the cockpit and one on the desk.

By viewing the instruments and also by following the course of the receiver as viewed by the automatic recorder, the instructor is able to convey to the pilot under the hood his position both in respect to flight path and his altitude by means of operating the Lorenz Flight Indicator. This instrument indicates under the hood some the Lorenz System has readily accomplished.

It should be noted that a complete set of radio flight instruments are included in the D Type Trainer, thus permitting instruction in instrument flying. The radio compass is replaced by the manual hand of the Lorenz indicator and can be adjusted by the operator in landing due to the problem.—AVIATION, June 1939.





"GO DOUGLAS" ALL THE WAY ON THESE WORLD-WIDE AIRLINES

[illegible]

# THE AVIATION NEWS

SERIES COMMENT FORECAST

DANIEL SAYEN  
© F. McKeenly, Pacific Coast  
Steam Shiplight, Washington  
S. R. Lark, New York

SEEK COMMENT FORWARDS

JUNE 1939

## Congress Gets to Work on Air Law

(Story on page 62)



**TRANS-ATLANTIC ARRIVALS**  
Above—Dr. Hugo Bokman, to plead against the Berlin embargo. Fifth—The British Commander to look over our military tactics. Standing—The gangster P. Bowers. Air Commanders J. S. Wolf; C. S. Horner; A. T. Harris and Cooper. Fifth—Photo of the wreckage of Lufthansa's latest plane. Above—Flying over Green Whistler. In middle line



AVIATION  
 June 2006

馬丁·路德·金  
Dr. Martin Luther King  
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## Who's Who in This Month's News



**ANOTHER:** Jacques-Louis Cartier gave the highly praised first golf performance in the 1927 Bendis Proclamation to Howard Walsh, V. P. of Bendis Regard.



**WOMEN GATHER**—Six members of the Early Birds will call for the Wright Kollection. Left to right—Jack Wilson and Violet Venable of Chicago; P. G. B. Morris of Los Angeles; R. S. Fowler of Big Bear City; Betty Laird of Chicago and Harry Graham of San Francisco.



**BIRTHDAY PARTY:** Consolidated Alaska last month went to town in celebration of its 50th anniversary. Here are five who (very properly) drew their share of the celebrations. Center — Walter Ruckel, Jr. Flies

founder, and President. Top left—Charles T. Leigh, Vice President. Lower left—J. M. Leddon, Chief Engineer. Top right—C. A. Van Dusen, Vice President and Works Manager. Lower right—E. M. Selt, Vice President.

## AVIATION

price: \$4.95

1



**BIG FOUR:** These are the Generals who last month staged the SHQ maneuvers. Above left—Wing Gen. Frank M. Andrews, commander of the 48th SHQ Air Force. Above right—Brig. Gen. F. L. Martin, 1st Wing. Lower left—Brig. Gen. Deles G. Emmons, 1st Wing. Lower right—Brig. Gen. A. R. Knechtel, 2d wing.



**HIMSELF!** Patricia (Pat) O'Walsh, eastern journalist favorite woman in business, spent Air Mail Week in Washington. She is American Airlines' New York press agent.

**REVIEW:** Anthony Folker, whose uncle is the Anthony Folker, special for South America aboard a P.A.A. clipper. He is a test engineer for Elbarix.

## In Tabular Review

THE AIRCRAFT YEAR BOOK FOR 1938  
By Donald Moxon, Aeronautical  
Engineer and Commander of Aircraft  
New York City: E.P. Dutton & Co., Inc.

Measures of aviation development in America in Howard Nigam's edited presentation of facts and figures. With the 1958 edition it rounds out the second decade of continuous publication. Current edition covers 1958-1960. Typeset and printed in U. S. military style, 50 ave. military, many of the letters being on the available-for-export list. Special emphasis is placed on U. S. position as an exporter on world markets. Included up, however, is the need for expanded research facilities in this country if our hope is to maintain our position of world leader in aircraft. In following our lead, other countries have embarked on research programs that threaten to outrun our own.

**FIFTY-FIVE PLAINS OF THE WORLD**, edited by Eugene-Louis Coues, E. C. Fortney-Smith, F.N.S., compiled by Fred Sargent, 2d Appleton-Century Co. Inc., New York and London, 1939; 288 pp., \$2.00.

An attempt to "out-Jane Jane" is told from that narrow compass within range of its prototypes by a wide margin. As a history and a guide to the British Royal Air Force (postmodern musings, uniformed descriptions, etc.) it undoubtedly has merit, but as an index to the fighting aircraft of the world it is full of blind spots. As might be expected, British treatment is fairly complete, and U.S. coverage is first; but the Russian and German information is hopelessly out of date and quite incomplete.



TRAUBMAN, HENRY, *Fischer Von Felsungen*.  
Dr. Henry Traubman, August Druck.  
Richard F. Shaw Verlag, Germany.  
1933. 328 pp.

Recognizing that our transportation is an ancient national phenomenon and that it has many unique characteristics, the authors have turned out a volume designed to stand as "a monument to the man, who, for the first part, publicly and anonymously, have established regular air traffic over countries of means." Statistics and photographs of most of the principal scheduled airlines of the world are will presented. There are a few gaps, but they will undoubtedly be filled in as subsequent editions which operations everywhere recognize the importance of the work and contribute more fully.

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# AVIATION'S OPERATORS CORNER

Tackling the Issues with

LES NEVILLE



**Compulsory insurance laws for airplane owners** are hovering in a number of states right now and concern of later aviation people will have to do something about them as they may easily erode another source threat to private flying. As far as we can see we are not the politicians would such legislation. Insurance companies are opposed for a number of reasons. They have found by experience with automobiles that compulsory insurance increases rates, hampers supply of accidents, and spreads litigation, complicating claims, and cost of law, and finally, insurance delays on the part of drivers. Such laws do not insure compensation of the privilege of possessing this and many individuals had examples are permitted the protection of full insurance. The rates now in effect are necessarily high because of the freedom spread and any increase in rate would have a great many people to give up insurance. Compulsory insurance would mean them to give up flying. It therefore becomes all of us to make every effort to keep such legislation off the statute books of our own state.

**Seventeen ACAA**, widely known division of Southern Association of Flying and another aerial club which promotes to be bigger and better than any of its own competitors and that is why they play. When you have a list of 17 of them you haven't got to be surprised and understand. The Southern ACAA (AA) is a group in sponsoring the event and Golf Balling Company is offering them a lot of it. All right place within a 40-mile radius of Birmingham. A large number of Southern's air carriers in that suburban in five.

**Publisher Harry Evans** of the *New York Times* has been named to the position of chairman of C.A.S. you will appreciate the map into Canada. From this up their regulations. I've read, little P's P's pamphlet, 100 short pages in length, tells you all you



Regulation in the General member.

need to know about Canada. Air Regulation. Reading this, from cover to cover, about half an hour. There is a striking similarity in form between the Canadian book of regulations and our 70th Rules Governing the Island Waters of the United States, in respect of which was the second of every power has in the country. It might be well for our friends in the

States to borrow a copy of the "Bird Rules" from the Department of Marine Inspection and Navigation and look down C.A.S. in the books.

**Tomorrow's new driver**, Major Walter Williams, is testing trial use of the aircraft of the state police can be made for the promotion of aviation. He has bought five Cessna and 1950 models for five five ground and flying schools he is establishing in any other of the state. Out of each of the five groups, the best qualified graduate of the ground course will be chosen and selected an airplane and instructor for each training. Others will be given 75 private pilots and about 3500 persons for flying time from local operators.

## Operator's Committee Named

**California aircraft operators speed association plans.**

**RAVEN INVESTIGATION** plans for a permanent association of operators and pilots' association, as tried at a recent general meeting in Los Angeles, through investigation. Southern California pilots and operators who had been elected to the executive committee in the general meeting, met April 10 and drafted detailed plans for the California Aircraft Operators' Association, with the intention of later affiliating with a national operators' association. The



California operators committee. Left to right: Joe Lewis, E. G. Hawkins, Earl Johns, E. A. Sykes, and Percy Martin.

speakers elected a small working committee to develop detailed plans and present them at a general meeting in the near future. The committee elected consisted of Kenneth C. Hawkins, president, and Judge R. Ray Schaefer, secretary. Other members, Joe Lewis and Edward O'Neil. The committee was organized to immediately establish a membership campaign in a preliminary to the holding of a general meeting in August 1940, 1940, etc., but members of the association to serve the entire State of California. And thereafter the group of Twelve Coast states comprising of California, Arizona, Nevada, Oregon, Washington, and Idaho. All pilots and operators desiring to affiliate with the organization are urged to write at once to Kenneth C. Hawkins, Los Angeles Municipal Airport. It is tentatively planned to set dues at \$1 per year for pilots and \$2 per year for commercial operators.



Thirty-five airplanes stored at Wings Field (Los Angeles) Bay have made this new hangar necessary. It is 100 ft. high, 15 ft. wide and 15 ft. deep. It is designed to match the other attractive buildings at the field. George H. Miller, who operates the airport.

## Mileage Costs Low

**Business should compare figures with those of automobiles.**

THE INEQUALITY IN OPERATING COSTS between automobiles and private airplanes is a constant reminder for one in solo work. Because of the price of operating flying costs on so heavily been it is easy to lose sight of the mileage costs and there is a big opportunity for manufacturers and operators alike to educate the public on this point. A very enlightening study of them and figures is available in a recent S.A.E. paper presented by Gen. de Ploncy, commanding engineer, private flying of long operations, and one who has given much serious thought to the subject. One of the slides from Dr. de Ploncy's paper is presented herewith.

In comparing the cost of purchasing and operating airplane, automobile and motor boats the writer points out that the fixed charges on all three types of transportation amount to approximately one-third of the total operating cost. But the airplane, being provided in small quantities, is consequently expensive. It follows, therefore, that reduced airplane costs, which will come with greater production, will result in savings in air travel costs as compared with other forms of transportation, giving the airplane of the future a considerable economic advantage over surface vehicles.

But all of this airplane operating economy is of no avail if private time flies are to be so economical. Dr. de Ploncy stresses the need for the development of ground facilities as well as the improvement of transportation system. Small ships, not expensive aircraft, private, should be provided in any commercial production to rural or vacation districts and landing and fueling stations along the routes should be made generally available for companies. Such landing fields could be benefited not only for civil but for military use.

In concluding Mr. de Ploncy says, in part, "The development of private flying is of immense importance to the nation, first, because it will establish a new form of private transportation, and second, because it will form a large group of individuals with an experience that will be of great value to the nation for national defense. Those who think that the commercial airlines will provide a means of rapid material to be called on in the event of war are deluding themselves. Their present aircraft, passenger and freight airlines would be even more vital to the country in such an emergency than they are now. Airplane pilots could not be spared for military service. Experienced men for a rapidly expanding air force would have to be drawn from other sources, private flying offers a natural personnel of flexible quality—selected as to experience, adaptability, and the ability to fly."

"The utilization of private flying is essential for military purposes in return for much economy, as it is often less preferable to train military pilots from the beginning. That this may be true, when this pamphlet, it seems highly probable that a sufficient number of pilots are not generally will ever be trained in peace time. The advantage of utilizing pilots, who have already acquired experience in civil life, deserves the most serious consideration particularly since we know that European nations have found it expedient to build up their potential air forces by having the development of the private pilot done by a subsidy and the supervision of flying schools."



LOUIS DE PLONCY, who presented and possible private flying.

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## Approximate Cost of Airplane and Airplane Operation

	Cost of Airplane		Cost of Operation	
	100 lbs. Aircraft	200 lbs. Aircraft	100 lbs. Aircraft	200 lbs. Aircraft
1000	1000	1000	1000	1000
2000	2000	2000	2000	2000
3000	3000	3000	3000	3000
4000	4000	4000	4000	4000
5000	5000	5000	5000	5000
6000	6000	6000	6000	6000
7000	7000	7000	7000	7000
8000	8000	8000	8000	8000
9000	9000	9000	9000	9000
10000	10000	10000	10000	10000







## Trans-Canada Rube the Lamp

(Continued from page 20)

are for the Trans-Canada efforts to put through such a Vancouver-based program and let us not forget it.

Our wonder tale is only half told, too. But even if it is the plan of one of our contemporary-rebels, aviation, or their Canadian co-workers, remember that for years you have been spending about half your country's fighting day to day technical problems and using up the other half worrying what the government is doing about making airlines for you and other factors are going to spring on you soon. There was a chance to be wholeheartedly concerned with making, but engineering as perfect as air law is as heavily possible. The Art in its presence of a "preliminary period" had been removed that great deal of all air law hurry—the pressure for spectacular speed, not of flight but of airplane building. The today must be that some good has provided you with a single lamp. Rube is in and put your air line, but almost wisely.

### The Airway

The most of preliminary report along the route has of course passed a preliminary. At 40:00 of the apparently projected beds were made perfect, but there are more than enough to give the route potential information uncertainty fields between any of the eleven cities designated as stops on the Vancouver-Moncton lay-out. (State package where the projected route runs across the top of our own state of Maine). And most of the cities along the route already have fields, single for landing equipment, by good means and the sympathetic openness of the Canadian landscape opened up the city airports here (the have located at most where landing elevations are low and where sitting regulations against obstruction building have already been passed or are projected in the near future. Some cities, Montreal is an example, are in process of extending runways, increasing taxi, improving boundaries and floodlights, etc. Toronto is going ahead to develop two terminals, one immediately in town, another in the suburbs where lack of obstacles will make approaches more practical in all-weather weather.

The terrain along the airway itself is—certainly to popular American con-

ceptions—probably superior to any air-continental route in the States. There is hardly a hill over 2000 ft east of Lakeshore. The Rockies west of Lakeshore are narrower and west the point of evening-on line or lower than in at least three of the North American transcontinental. There is not a scheduled stop on the route over 4000 ft in elevation. Snow will of course be a long-term problem, but a careful study has been made of Northwest Airlines' other dangers and potential dangers it will prove less than adequate.

As the radio beacons and lights, the history of Transport seems to have agreed to what the Trans-Canada route in for all intents and purposes an inseparable part of a North American airway network. There are already three air line beds between the U. S. and the new Canadian system—at Montreal, at Winnipeg and at Vancouver. More are in prospect. American transport cross Ontario between Buffalo and Detroit. Fullerton of Trans-Canada plans will for crossing Maine. Links between the U. S. and Alaska across Canada are under discussion. As a result Canada is occupying an airfield so that American pilots will land at at least one of the border as much of it. Alaska intends to go in at approximately 150-mile intervals along the whole coast-to-coast route. Alaska itself are already in place. Back by the Radio Receiver Company of New York they will be similar to the latest installations being installed by one B. A. C. Such stations will have four red beacons 140 ft high. Each transmitter will have output 150 or 400 watt output. Mark will be added for identification wave and range transmitters. Specifications on Canada for light, because have been obtained with American promise for almost a decade.

### Flying Equipment

Trans-Canada's selection of Lockheed transports rather than larger equipment follows logically from an analysis of the night's traffic, particularly where lack of obstacles will make approaches more practical in all-weather weather.

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Satisfy yourself that the new Reliant gets off easily and quickly under the most difficult conditions. Take-off in a stiff cross wind.

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Check the Reliant as a fighter. Compare its smooth ride on a rough day with any other plane of its type. Find out that it is stable under all conditions. Compare the comfort of its seats, its spaciousness, its ventilation, its vision, the quality and balanced styling of its upholstery, the accessibility of the instruments and controls and its large baggage capacity.

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AVIATION  
JUNE 1946

51

## Trans-Canada

(Continued from page 48)

It would seem, therefore, almost certain to be a new air line set up in business with such a beautiful record — if a report that Trans-Canada showed from the first day is approved that it must stand its equipment with personnel of equal quality.

### Personnel Training

At its base and under the Canadian woods are full of experienced flying men. Now with thousands of hours of the toughest sort of winter duties in their log books. But few of them had extensive multi-engine or high performance experience. Now had one of them had the opportunity to see modern instruments and radio in actual all-weather day-and-night air line operations.

Trans-Canada's flying operations to date have been very busy and of less full-scale training exercises. By the end of last February, the last Spring entry had 37 men. A few months have more been added. The big majority have in this time passed through an elaborate schedule of qualifications.

They have been dealt with a complete introduction to their new equipment and its mechanical functions. They have been drilled out at Winnipeg or in the Grande-Vallée in the instrument flying and night operations. Then have worked through the Trans-Canada's training to build up their flying experience at all their winter fields. Starting last December, cross-country flights were started between Vancouver and Edmonton, across the Rockies. In February the ground forces were also sufficiently advanced to enable aerial transport operations for each flight. The Ministry of Transport had its own weather service set up at most terminals, and 30-hour shifts in various other parts. Dispatches were checked out by dispatchers. Flights followed flight-logs. Maintenance crews were through each sort of servicing and inspection that will be expected of them after full operations are started.

Finally on March 1 the company was ready to conduct experimental air mail flights between Winnipeg and Vancouver. The second month, regular service has been continued with about thirty or forty per cent of scheduled equipment.

Probably every day in the Canadian

(Turn to page 51)



## Symbol of Skyway Safety

AMERICAN AIRLINES received recently Aviation Magazine's Maintenance Award. Well merited is this recognition of a system which has developed a rigid routine of daily inspection, reports and records for all operating equipment. What is realized that this Routine consists of 40 steps, flying 10,000 miles daily, on routes extending from Boston to Los Angeles, the monumental task of maintenance is apparent. In this well organized safety schedule, engine conditioning is of the foremost importance.

And it is here that "dag" colloidal graphite plays its part. During set-up and assembly, this supplementary lubricant is applied to all friction parts where its inherent ability to lubricate, while, at the same time, withstanding high temperatures and heavy pressures, gives added protection against wear. The Adheson Colloids Corporation is happy to contribute to the maintenance of equipment which is building on obvious record of safety for its passengers and crews. Send for detailed technical information.

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#### Air Commerce Bureau Fairchild 24's

Aeromarine Dependable Instruments were selected for the twenty-three Fairchild 24's recently purchased by the Bureau of Air Commerce, the largest order placed by the Bureau with a single manufacturer.

Designed for field use by Bureau inspectors these ships will fly under diverse service conditions imposed by varying climates and altitudes from below sea level to 12,000 feet. Like the Fairchild 24's, the Aeromarine instruments—compasses, air speed and rate of climb indicators, oil temperature and oil pressure gauges—meet the exacting requirements of the Bureau of Air Commerce.

Write for descriptive and specification data.

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AIR SPEED INDICATORS	FUEL PRESSURE GAUGES
RATE OF CLIMB IND	MANIFOLD PRESSURE GAUGES
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All instruments are available in metric calibration.

## DEPENDABILITY

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100 Avenue of the Americas, New York 100

AVIATION  
June 1937

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#### Trans-Canada

(Continued from page 67)

air transport industry has made vivid and memorable memory of showing up a new route at a new airport or even some new such halfhearted flight schedule—how busy, everyone now recognizes, give it someone's last dispatches stating every intention to get things all as often—to make a good impression. Trans-Canada doesn't do things that way. Typical is the following account from the Canadian National Magazine of the start of the experimental mail service.

But another held up the scale for several days. On March 8 one of the planes landed at St. John's. I left Winnipeg seven hours and 15 minutes out of Vancouver.

Of course the weather was ideal or the plane would not have flown the route. Mr. Colyer said at once in a newspaper's question. They are not pilots on a new job and this is just part of the training. We will take no unnecessary chances. The first was an excellent first shot about what we would expect at the state of development.

#### The Future

Little's plane left to be done of course. It will be a year or two before all the fields will have planes on their backless dimensions and reports. There is still much to do on lighting and radio-aiding of the system, but in the air was. There are problems to be worked out with the U. S. Government over provisions to cross Maine and over new cross border fields. There will be airplanes to be driven up and adjusted to, with other air transportation.

Matters of air law regulations, inspection and rules are still considerable areas still in hand. But with the government to clearly connect with every phase of the new Company, there are no difficulties to be feared on that score.

The industry are still at work on equipment and maintenance matters. The Canadian National office, here where most such problems are solved by airworking quickly light, with no purchasing and financial problems. Later the rail company's policy at St. John will be also points for Trans-Canada's passage through, possibly there will also be some reports traffic after set up. And oh yes, there will be business to be secured, turned and served off. This is an Air-Canada project.



## BOEING CLIPPER . . . 314

Largest airplane ever built for service on any of the world's airports is the new 74-passenger BOEING Model 314 flying boat. This luxury liner of the air is designed to open direct air service to the Pacific with mail, cargo, and a sizable lot of passengers aboard. The first of the new 41-ton Boeings has now reached the testing stage, preliminary to introduction on the world-enclosed Pan American Airways System.

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STATION

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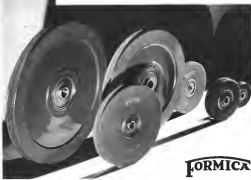


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## 90% LESS "LOAD" ON THE PILOT

... ~~don't~~ Louis Schwitzer, Sr.



Leontine Harris, 38, (left), nationally known radio-matrons and general president, Schick and Company Co., of Indianapolis, manufacturer of Radio Station, television and in development group. Mr. Schick and his son, Louis, Jr., own three third floors and a five-story apartment.

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"Their safety has always been entirely too dependent upon the skill of the pilot. But now—the Waco 'H' assumes 90 per cent of the responsibility!" says Louis Schneider, who for fourteen years has done the majority of his business traveling in his own airplane.

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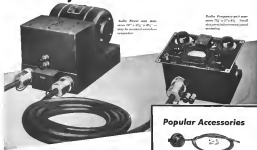
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June 1938

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Illustration of step-tapered tubes with section of "Vee-Kay" (see next)

Name

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(2) The wall thickness on tapered section is usually heavier than on the larger diameter.

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